

Patent Claims

1. A drive circuit for a switch (T) connected to a rectifier arrangement in a switching converter which provides an output voltage (Vout) from an input voltage (Vin), the drive circuit having the following features:
- a first input terminal for feeding in an output voltage signal (S1) dependent on an output voltage (Vout) of the switching converter,
 - a controller arrangement (40) having at least one control amplifier (OTA1) and a compensation network (41) having at least one capacitor (C4, C5), the output voltage signal (S1) being fed to said controller arrangement and the latter providing a control signal (S4),
 - a protection circuit (30), which is designed to detect at least one critical state of the switching converter and which provides a protection signal (S3) in a manner dependent on the presence of a critical state, the protection circuit (30) having a discharge circuit (32) coupled to the compensation network (41),
 - a signal generating circuit (20), to which the control signal (S4) and the protection signal (S3) are fed and which provides a drive signal (S5) having drive pulses according to the protection signal, the duty ratio of which drive signal is dependent on the control signal (S4).
2. The drive circuit as claimed in claim 1, in which the discharge circuit (32) is driven, in a manner dependent on a detection of a critical state, to discharge the at least one capacitance (C4, C5) of the compensation network (41).

3. The drive circuit as claimed in claim 1 or 2, in which the discharge circuit (41) has a switch (S32; N2), which is connected between the compensation network (41) and a reference-ground potential (GND) and which is driven in a manner dependent on a detection of a critical state by a control circuit (L32).

4. The drive circuit as claimed in one of claims 1 to 3, in which the discharge circuit (32) detects the discharge state of the compensation network (41) and generates a discharge signal (S6) dependent on the discharge state.

5. The drive circuit as claimed in claim 4, in which the discharge circuit has a current measuring arrangement (M32; P1, P2, Iq, R3, R4, N1, OPV1) for detecting a discharge current (I32) of the compensation network (41) and generates the discharge signal (S6) in a manner dependent on an amplitude of the discharge current (I32).

6. The drive circuit as claimed in claim 5, in which the discharge circuit generates the discharge signal in a manner dependent on a comparison of the discharge current (I32) with a reference current (I1).

7. The drive circuit as claimed in one of the preceding claims, in which the protection circuit (30) generates the protection signal (S3) in a manner dependent on the discharge signal (S6).

8. The drive circuit as claimed in one of the preceding claims, in which the output voltage signal (S1) is fed to the protection circuit (30), the protection circuit (30) detecting a first critical state if the output voltage signal (S1) lies below a first threshold value (V2).

9. The drive circuit as claimed in one of claims 1 to 7, in which the output voltage signal is fed to the protection circuit (30), the protection circuit (30) detecting a first critical state if the output voltage
5 signal (S1) falls below the first threshold (V2) after the output voltage signal (S1) had previously exceeded a larger second threshold (V3).

10. The drive circuit as claimed in one of the preceding claims, in which the output voltage signal is fed to the protection circuit (30), the protection circuit (30) detecting a second critical state if the output
10 voltage signal (S1) falls below a third threshold, which is less than the first threshold.

15 11. The drive circuit as claimed in one of the preceding claims, which has a connecting terminal (K3) for the application of a supply potential (VCC), the supply potential (VCC) being fed to the protection circuit
20 (30) and the protection circuit (30) detecting a critical state if the supply potential falls below a predetermined fourth threshold.

25 12. The drive circuit as claimed in one of the preceding claims, which has a further input terminal (K2); to which can be fed an input current signal (S2) dependent on the input current (I) of the switching converter, the drive circuit (20) setting the duty ratio of the
30 drive signal (S5) in a manner dependent on the input current signal (S2) and the control signal (S4).

13. The drive circuit as claimed in one of the preceding claims, in which the drive circuit (20) does not generate any drive pulses if the protection signal has
35 a predetermined level.

14. The use of a drive circuit as claimed in one of the preceding claims in a step-up converter to which an AC voltage (V_{in}) is fed on the input side.

5 15. A method for driving a switch (T) connected to a rectifier arrangement in a switching converter which provides an output voltage (V_{out}) from an input voltage (V_{in}), the method comprising the following method steps:

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- provision of an output voltage signal (S1) dependent on an output voltage (V_{out}) of the switching converter,

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- generation of a control signal (S4) from the output voltage signal (S1) by means of a control arrangement (40) having a control amplifier (OTA1) and a compensation network (41) having at least one capacitor (C4, C5),

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- provision of a drive signal (S5) having a sequence of drive pulses for the switch,

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- monitoring of at least one critical switching state of the switching converter,

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- interruption of the generation of drive pulses (S5) if a critical switching state is detected and at least partial discharge of the at least one capacitor (C4, C5) of the compensation network.

16. The method as claimed in claim 15, in which a discharge current (I_{32}) of the compensation network is detected and the compensation network is discharged until the discharge current has fallen below a predetermined threshold.

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17. The method as claimed in claim 15 or 16, in which a first critical state is detected if the output voltage signal (S1) lies below a first threshold value (V2).

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18. The method as claimed in one of claims 15 to 17, in which a first critical state is detected if the output voltage signal (S1) falls below the first threshold (V2) after the output voltage signal (S1) had previously exceeded a larger second threshold (V3).

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19. The method as claimed in one of the preceding claims, in which a second critical state is detected if the output voltage signal (S1) falls below a third threshold, which is less than the first threshold.

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20. The method as claimed in one of the preceding claims, in which a third critical state is detected if the supply potential falls below a predetermined fourth threshold.

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